

Abstract

To drill micro-holes in a multi-layer substrate having a first metal layer and at least one second metal layer, and having a dielectric layer arranged between two metal layers, use is made of a solid-state laser. The beam of the laser, in a first operation, ablates the first metal layer and, in a second operation, ablates the dielectric layer down to the second metal layer. In the first operation, the laser beam is set to a repetition frequency of at least 15 kHz, focused onto the first metal layer and moved in a circle corresponding to the diameter of the desired hole, in such a number of passes until this metal layer is cut through. Then, in the second operation, the laser beam is set to a preferably lower repetition frequency, directed out of focus onto the dielectric layer exposed in the hole and moved, with a circumferential velocity which is higher compared with the first operation, in one or more concentric circles, until the dielectric layer is ablated in the hole region. The effective energy density in the second operation is selected, by setting the defocusing and the circumferential velocity, in such a way that the effective energy density lies below the threshold for ablation of the second metal layer.

2022055862001